

## CLAIMS

- 1           1.     A process for analyzing proteins or viruses in a sample  
2     comprising the steps of:  
3           dividing a sample having a protein or virus component into a plurality  
4     of aliquots;  
5           applying said plurality of aliquots in parallel to a first separation step to  
6     yield a plurality of partially resolved eluates; and  
7           subjecting said plurality of partially resolved eluates in parallel to a  
8     second separation step to yield a plurality of resolved fractions.
- 1           2.     The process of claim 1 further comprising the step of collecting  
2     at least one of said plurality of resolved fractions.
- 1           3.     The process of claim 2 wherein collection of the at least one of  
2     said plurality of resolved fractions occurs onto a MALDI target or plate.
- 1           4.     The process of claim 1 further comprising the step of analyzing  
2     at least one of said plurality of resolved fractions.
- 1           5.     The process of claim 4 wherein analysis is by mass  
2     spectrometry.
- 1           6.     The process of claim 5 wherein said mass spectrometry is  
2     performed on a MALDI mass spectrometer.
- 1           7.     The process of claim 5 wherein said mass spectrometry is  
2     performed on an orthogonal MALDI mass spectrometer.

1           8.     The process of claim 1 wherein at least one of said first and said  
2     second separation steps separate on a basis selected from the group consisting  
3     of: charge, molecular weight, and hydrophobicity.

1           9.     The process of claim 1 wherein at least one of said first and said  
2     second separation steps uses a chromatography resin or chromatography  
3     membrane.

1           10.    The process of claim 1 wherein at least one of said first and said  
2     second separation steps comprises a separation buffer that varies monotonically  
3     between individual aliquots or individual eluates.

1           11.    The process of claim 1 wherein at least one of said first and said  
2     second separation steps comprises a separation matrix in linear or two-  
3     dimensional array.

1           12.    The process of claim 11 wherein said first and said second  
2     separation steps occur with matrices maintaining well addresses in each of the  
3     two matrices.

1           13.    The process of claim 1 wherein at least one of said first or said  
2     second separation steps occurs within a microplate.

1           14.    The process of claim 1 further comprising the step of digesting  
2     said plurality of partially resolved eluates prior to subjecting said plurality of  
3     partially resolved eluates in parallel to said second separation step.

1           15.    A process for analyzing proteins or viruses in a sample  
2     comprising the steps of:

3           dividing a sample having a protein or virus component into a plurality  
4   of aliquots;  
5           applying said plurality of aliquots in parallel to a first separation step to  
6   yield a plurality of partially resolved eluates;  
7           subjecting said plurality of partially resolved eluates in parallel to a  
8   second separation step to yield a plurality of resolved fractions;  
9           digesting said plurality of partially resolved eluates with a proteolytic  
10   enzyme to yield a plurality of digested eluates; and  
11           subjecting said plurality of digested eluates in parallel to a second  
12   separation step to yield a plurality of resolved peptide fractions.

1           16.   The process of claim 15 further comprising the step of  
2   collecting at least one of said plurality of resolved fractions.

1           17.   The process of claim 16 wherein collection of the at least one of  
2   said plurality of resolved fractions occurs onto a MALDI target or plate.

1           18.   The process of claim 15 further comprising the step of analyzing  
2   at least one of said plurality of resolved fractions.

1           19.   The process of claim 18 wherein analysis is by mass  
2   spectrometry.

1           20.   The process of claim 19 wherein said mass spectrometry is  
2   performed on a MALDI mass spectrometer.

1           21.   The process of claim 19 wherein said mass spectrometry is  
2   performed on an orthogonal MALDI mass spectrometer.

1           22.    The process of claim 15 wherein at least one of said first and  
2   said second separation steps separate on a basis selected from the group  
3   consisting of: charge, molecular weight, and hydrophobicity.

1           23.    The process of claim 15 wherein at least one of said first and  
2   said second separation steps uses a chromatography resin or chromatography  
3   membrane.

1           24.    The process of claim 15 wherein at least one of said first and  
2   said second separation steps comprises a separation buffer that varies  
3   monotonically between individual aliquots or individual eluates.

1           25.    The process of claim 15 wherein at least one of said first and  
2   said second separation steps comprises a separation matrix in linear or two-  
3   dimensional array.

1           26.    The process of claim 25 wherein said first and said second  
2   separation steps occur with matrices maintaining well addresses in each of the  
3   two matrices.

1           27.    The process of claim 15 wherein at least one of said first or said  
2   second separation steps occurs within a microplate.

1           28.    The process of claim 15 further comprising the step of digesting  
2   said plurality of partially resolved eluates prior to subjecting said plurality of  
3   partially resolved eluates in parallel to said second separation step.

1           29.    The process of claim 15 wherein digestion occurs with a  
2   proteolytic enzyme.

1           30.    The process of claim 18 further comprising the step of analyzing  
2   at least one of said plurality of partially resolved eluates prior to digestion in  
3   concert with the corresponding resolved fraction.

1           31.    The process of claim 30 wherein analysis is by mass  
2   spectrometry.

1           32.    The process of claims 1 or 15 wherein the step of applying said  
2   plurality of aliquots in parallel to said first separation step is performed by a  
3   robot.

1           33.    The process of claim 1 or 15 further comprising the step of  
2   affixing a machine-readable label to at least one collection selected from the  
3   group consisting of: said plurality of aliquots, said plurality of partially  
4   resolved eluates, and said plurality of resolved fractions.

1           34.    The process of claim 1 or 15 further comprising the steps of:  
2   labeling a subsample with a unique tag; and  
3   combining said subsample with a second uniquely labeled subsample or  
4   an unlabeled subsample prior to said plurality of aliquots.

1           35.    A kit for separating proteins or viruses within a sample  
2   comprising:  
3   a first separation matrix;  
4   a second separation matrix;  
5   a separation buffer varying in concentration; and  
6   instructions for the use thereof for parallel separation of a sample into  
7   resolved proteinaceous or viral fractions.

1           36.    The kit of claim 35 further comprising a MALDI target for  
2   collection of a resolved fraction and subsequent mass spectrometric analysis  
3   thereof.

1           37.    The kit of claim 35 further comprising a machine-readable label  
2   affixed to at least one of said first separation matrix, said second separation  
3   matrix, and a container enclosing said separation buffer.

1           38.    A sample separation system comprising:  
2           a pipetting robot;  
3           a first separation array;  
4           a second separation array; and  
5           a microprocessor directing said pipetting robot to transfer material  
6   between said first separation matrix and said second separation matrix.

1           39.    The system of claim 38 wherein said first separation matrix and  
2   said second separation matrix are both microplates.

1           40.    The system of claim 38 wherein said pipetting robot further  
2   comprises a gripping actuator.

1           41.    The system of claim 39 wherein said microplates maintain well  
2   addresses between said first separation matrix and said second separation  
3   matrix.

1           42.    The system of claim 38 further comprising machine readable  
2   labels affixed to said first separation matrix and said second separation matrix.